

Extracts of Letters from Mr. Lassell.

“ You will, I am sure, be pleased to hear that I have gained a long march further in the art of figuring specula. I have successively refigured both the 20-foot mirrors, which are decidedly superior (especially A, that now in the tube) to the surface with which I made all my observations last year. I shall therefore enter the field with *Neptune*, *Uranus*, &c. on a vantage ground this year. The improvement I have made is not so much in the greater correctness of the general curve as in its greater regularity and continuity, producing superior definition, and neater, rounder, and harder disks of stars. I have attained a much more complete control over the polishing machine, and take to it now, without risk of injury and with strong probability of improvement, surfaces such as formerly I dared not touch. I am now fully persuaded of the competency of the machine to do all I ever hoped from it, and more than I ever hoped in giving correct curves with short foci. I have lately made a 12-inch mirror of $89\frac{1}{2}$ inches' focus without sensible error from the parabola, and sharper in definition than I had ever previously made a 9-inch mirror of 112 inches' focus. Stars are beautifully shewn by it, even the most difficult doubles, such as ζ *Herschel* and δ *Cygni*, the severest tests of telescopes. The best figures also on the 9-inch I have hitherto obtained are thrown into the shade by some recent surfaces, which shew me that a degree of excellence is attainable of which I had never before dreamt. Such pictures of stars I never saw before. These figures on the smaller specula, and the improved surfaces of the 20-foot, give me sanguine hopes of still further excellence in the latter, and to this point I am now bending my attention. I am surprised by the *quality* of vision of the short-focus telescope: I see no increase of loose light about a star, nor greater hardness of rings; nor should I know by any inferiority of vision that I was not looking with a focus of 12 diameters. I have improved the mode of supporting the 20-foot mirror.”

Mr. Lassell mentions the following particulars respecting the fourth satellite of *Jupiter*. On the 13th of June, in the early part of the evening, this satellite seemed so small as to suggest the idea that it was a faint star which had got accidentally in the line of satellites. A little later, the satellite was again noticed with another telescope, and appeared *reduced to one-half its ordinary magnitude*. At about 10^h it was far from being obvious in an excellent Gregorian of 4.7 inches' aperture: indeed, it was not seen for some time by a young lady who is not unaccustomed to look through telescopes. Mr Lassell further remarks, “ that the transits of the fourth satellite and its shadow over the disk of *Jupiter* seldom occur; in these cases, however, the satellite appears as a large dusky spot,

and the shadow is a black spot much larger than that of any other satellite, not excepting the third. This would seem to shew that the fourth is the largest satellite, though, when seen off the disc, it generally appears to be the smallest, and is always, I think, the least luminous."

"The variation of brightness seems to indicate a revolution on its axis. I have no doubt that in a less degree the third satellite is partially obscured by dark shades or spots; for when seen on the face of *Jupiter*, its form is an irregular oval, though the shadow is round."

Mr. Lassell proposes to re-examine these satellites with care when *Jupiter* is next in opposition.

*On an improved Compensation-Balance.** By Mr. Hartnup,
Director of the Liverpool Observatory.

"The Liverpool Observatory was established chiefly for rating and testing the chronometers of vessels which sail from that port. In a large majority of cases the seaman relies solely on his time-keepers for the determination of longitude, and is frequently unable to employ any other means. Hence it became my especial duty, as director of this establishment, to devote my attention particularly to everything which could improve the going of marine chronometers. On my appointment I gladly availed myself of the permission of the Astronomer Royal to make myself fully acquainted with the process of rating chronometers at the Royal Observatory, and I have mainly adopted the plan followed there.

"The chronometrical department of the Liverpool Observatory was opened to the public in the summer of 1844, and several chronometers belonging to North American packet ships were sent to be rated. The same chronometers were returned to the observatory in the following winter, after having made the voyage to New York and back. On comparing the land-rates given in the summer with the sea-rates made during the voyage, these did not differ very sensibly in those chronometers which had gone steadily at the observatory in the summer; but on rating them again in the chronometer-room, they were found to be *losing more* by from one to four seconds a-day. The chronometer-room had no fire in it, and the temperature, which in the summer had been about 60° , was now only 40° . As I supposed the change of rate arose from change of temperature, I removed the chronometers to my sitting-room, in which the temperature was about 60° , when they immediately returned to their former rates. The chronometers were removed

* The reader will bear in mind, that the fault of all watches furnished with the usual compensated balance is to *lose* in *extreme* temperatures when compensated for a *mean* temperature; or, what is the same thing, to *gain* in a *mean* temperature if going correctly in *extreme* temperatures.